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Pedagogical innovation in teacher teams – an organisational learning design model for continuous competence development

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Abstract: This paper presents findings from a longitudinal design-based research project examining how to enable reflection and pedagogical innovation in teacher teams. The article identifies and analyses the teachers' learning trajectories and innovative strategies when working together in the IT-pedagogical Think Tank for Teacher Teams (after this: ITP4T) (Weitze, 2014a), a competence development model, which was developed in an earlier phase of the research project. By using theoretical lenses from innovative knowledge development frameworks to examine the teachers' utterances, interactions and new learning designs, the research aims to clarify what kind of knowledge is being developed and shared in the teacher teams, and how this contributes to the organisational learning process. The context is Global Classroom, an innovative synchronous hybrid videoconference concept, where adult students can choose between participating in class on campus or from home via videoconference on a daily basis. The ITP4T model is a response to the needs and challenges the teachers and the organisation at VUC Storstrøms´ Global Classroom have been experiencing in this new teaching environment. The teachers find that they need to be pedagogically innovative when teaching in this learning environment, particularly when aiming to create equal learning conditions for the students in class and at home; in other words, they need to reframe their learning designs. The ITP4T model thus aims at creating a continuous practise for the teachers to be able to create their own competence development in teams in which the manager participates. The use of this new practice inside the school empowered the teachers in the organisation and created a new organisational learning design, which can innovate, help unravel complex questions, create new organisational knowledge and anchor new knowledge and practises. The teachers became both their own and the organisation's continuous competence developers when working in this learning design/innovative model. They experienced this as an efficient way of working which made them feel empowered.

Keywords: pedagogical innovation, competence development in teams, video conferencing, synchronous hybrid campus- and home-based education.

1. Introduction

> [It can be said in] one word: **Responsibility** for your own learning—**that** is motivating—more efficient. You get more out of it [...] if you have an organisation like this that brands itself in terms of being inspiring and creative, then something like this is madly important in that we are allowed to work and think and develop together (A teacher that has worked in the IT-pedagogical Think Tank for Teacher Teams model (ITP4T)).

This project investigates reflects on and looks into how new *practices can contribute to the creation of reflected, innovative and motivating learning designs in a hybrid synchronous video-mediated teaching context.*

1.1. A need for technological literacy

In many countries, the state and the municipalities are prioritising the use of many resources to digitalise education. The aim of such efforts is to create more motivating, efficient and differentiated learning possibilities for the students in order to provide them with the best possible education (Collins and Halverson, 2010). The world of education is changing, and many schools are challenged by motivational issues among the students. Educational IT can be defined as technology used in educational contexts. The Danish government has a hope that educational IT will serve as leverage to help develop a new and better way to create motivating learning possibilities. However, the impact of technology in the context of education depends on the way in which it is used (Luckin, Bligh, Manches, Ainsworth, Crook and Noss, 2012). Although technologies are physical tools and not theoretical thinking tools or concepts, they change not only the way we carry out a task, but also the way we think about the task (McLuhan, 1964; Hasse and Storgaard Brok, 2015). Recent research indicates that teachers should be better equipped to handle the interaction with new technologies at work. To meet the needs in modern educational institutions, the teachers must be trained to be able to learn, evaluate and analyse the following: new technology, technology in a situational practice, the

technologies' complex pathways, the impact of technologies on the profession and the interaction between these factors. These abilities can be described as *technological literacy* (Hasse and Storgaard Brok, 2015: 395). Technological literacies and innovative skills must be integrated as part of the teachers' training to build their competence and understanding of the technology which they need to use in the workplace (Hasse and Storgaard Brok, 2015; Weitze, 2014a).

The development of technological literacy is complex and has to take into account that the experience and use of technology changes when it is situated in the constantly evolving context of everyday life (Hasse and Storgaard, 2015). Digital technologies differ from stable, well-established technologies, such as pens, paper and books, by constantly demanding attention, challenging the teachers' routines and often providing more hidden and unexpected affordances. Therefore, the teachers must continuously learn about the many unexpected good and bad effects of digital technology in order to comprehend and be able to handle them. To foster the teachers' technological literacy, the teachers and educational institutions must be able to develop their own learning strategies for this continuous development in order to adapt it to the needs of their organisational context. In this research project, the teachers experienced difficulties with working in an innovative videoconference-based learning environment. In order for the teachers to be able to handle relevant but also unexpected and unpredictable problematic situations encompassing educational IT, there was a need for new approaches to competence development for this educational institution.

1.2 Organisational learning for teachers in an educational organisation

A strategy for organisational learning at many schools is to let a few engaged teachers lead the innovative development process and inspire the other teachers regarding how to use educational IT in their teaching. However, this approach can still make it difficult to enable the whole teaching staff to learn as not everyone is involved (EVA, 2008). Another strategy is to offer courses, which introduce the features of the new technologies. Although this is a necessary step in learning about the technology, the teachers still experience difficulties in knowing how to use the technology in their specific learning situation, for their specific students and within the context of the specific subject matter and learning goals. After attending a course, the teachers often find it difficult to find the time to experiment and invent new learning approaches within their already sparse preparation time, as their main responsibility is to ensure that the students will reach the relevant learning goals. The teachers often also miss the possibility to work and innovate with peers within these new knowledge areas (Dede, 2009; Weitze, 2014a).

Finally, many educational institutions create projects as part of their organisational learning strategy as a way to develop new knowledge. However, many projects are only for a few selected participants, are not anchored beyond the primary project's lifetime and are thus not retained as part of the organisation's knowledge. Therefore, it is important to develop ways to plan not only the development phase, but also the implementation and anchoring phase when using projects as innovation and learning strategies (Henriksen, Buhl, Misfeldt and Hanghøj, 2011).

For the above reasons, there is a need to develop reflective and innovative tools and methods for teachers in relation to the use of the IT in practice which will enable them to make informed choices when creating motivating and qualified learning designs with educational IT for the students. There is also a need to investigate what it takes to achieve a well-functioning knowledge sharing, communication and decision flow between the managers in the organisation and the teachers. This will enable the two actors to support each other in the best way, using their professional experiences to make the best choices in relation to the use of IT (Hasse and Storgaard Brok, 2015; Weitze, 2014a).

In the following, I present the case of the Global Classroom at the adult education centre (VUC) Storstrøm, including the empirical background for this research project, and introduce the challenges experienced when teaching in Global Classroom. This is followed by an introduction to the qualitative research methodology and the research design. In order to overcome the challenges, the teachers experiment with a continuous competence development model (ITP4T), which is presented after the introduction to the research design. This is followed by a theoretical and empirical analysis of important innovation and knowledge-creation processes.

2. Case

The research takes place at VUC Storstrøms' Global Classroom. Global Classroom is an innovative learning environment implemented in a full-time upper secondary general education programme for adult students lasting two

years. In this learning environment, the students can choose between participating in class or participating individually from their homes using laptop computers on a daily basis (Figure 1 a,b).

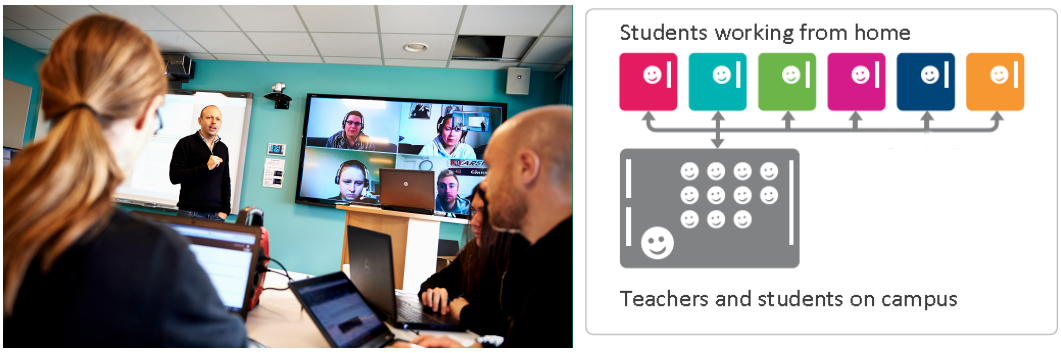

Figure 1: The Global Classroom set-up (a) (b)

The students have to attend at least 80% of the lessons to enter for the examination. VUC Storstrøm's management has decided to create this innovative learning environment to meet the adult learners' needs for variation and flexibility during the school day; the possibility to participate from home has been motivating for many of the students. However, the choice of this new digital learning environment, which aims to break down the walls of the classroom, puts the teachers in a challenging new teaching situation. This new teaching situation, in turn, requires that they develop new teaching strategies. The teachers were educated at universities, and very few, if any, have been trained in using educational IT during their previous education.

2.1 Challenges when developing learning designs in Global Classroom

A teacher's major role is to facilitate the learning processes for the students in order to develop qualified and motivating learning possibilities. Selander and Kress (2012: 2) use the term *learning design* to describe how the teacher shapes social processes and creates conditions for learning. A learning design can, in other words, be described as someone trying to facilitate a learning process for someone in order for this person to learn something (Qvortrup and Wiberg, 2012).

When a teacher experiences a new learning environment, he/she will have to consider if they can continue using their previous pedagogical strategies. A teacher's teaching strategies and learning designs are (at least as is often the case in Denmark) a personal decision, and thus teachers will often develop habits or best practices and personal teaching styles. The learning design will depend on the subject matter, the current area of the subject matter and who the students are (Hiim and Hippe, 1997). Most of the teachers in the Global Classroom experienced that they could reuse many of their previous teaching methods, except when occasional technical problems occurred. Additionally, they found that they had developed new competencies after working in the Global Classroom environment for half a year.

However, the teachers also experienced problems. Generally, they used many different teaching strategies for creating active and motivating learning designs to *move* the students to learn when teaching in a traditional brick-and-mortar classroom. These strategies often encompassed a range of hands-on activities and short periods of breaking out in groups etc. These motivating strategies are important in Global Classroom, since many of the adult students, according to the teachers, had motivational issues with respect to learning. According to statistics, 60% of the students at VUC had dropped out of school at least once before in the past. (Pless and Hansen, 2010). Many of the teachers' previous motivating learning designs were thus dependent on everyone being together in the physical classroom. For example, the biology teacher would teach about how the human heart was functioning by asking the students to dissect pig hearts in order to allow the students to discover and compare with what they had learned from reading about the subject. This was an example of a learning design that could not be re-used in Global Classroom. The teachers generally experienced difficulties activating the students at home to the same degree as the students in class. The students and teachers agreed (both in the questionnaires and in the interviews) that the students at home learned less, were generally more passive and often behaved like they were watching TV and not attending a lesson. This also encompassed difficulties when using teamwork between class-based and home-based students as collaborative learning break-outs during the lessons. During such activities the students often disturbed each other because of noise issues when staying in class to work in teams with the online students; the teams would also

occasionally leave the classroom, and as a result, they would not know when the teachers wanted to start teaching the whole class together again. Some teachers reported that this made them use less teamwork, which left the teachers dissatisfied. As a consequence, many of the teachers used more monologue-based teaching strategies. Such strategies were not very well-suited for this group of students who benefited from interactive and varied learning methods which involved them more and encouraged them to participate more actively in the learning process. Though the organisation had arranged courses to train the teachers for teaching in Global Classroom, it was difficult for the teachers to develop new ideas and to have time to develop their own learning designs for these new learning situations. In order to develop a new learning design for the educational institution, the research project therefore worked on two levels: 1) the teachers developed innovative learning designs for the students to facilitate motivating learning processes; and at the same time, 2) the research project developed a sustainable working practice that enabled the teachers to create new knowledge for the organisation by leading innovative learning processes—i.e. a new organisational learning design.

3. Methodology and research design

The research is part of an ongoing (2,5 year) design-based research project (DBR) (Reimann, 2011) which investigates the following: 'What elements, methods, processes and practices can contribute to the creation of reflected, innovative and motivating learning designs for teachers and students in a hybrid synchronous video-mediated teaching context, with a focus on how to create motivating learning for the students?' The products and processes from the research project have been co-designed with the participating teachers. After the development phase of the ITP4T (Weitze, 2014a), the model underwent a test phase with new teachers at another of VUC Storstrøm's schools to test the sustainability of the model and to enable further refinement processes. The study is conducted as a mixed method study using qualitative methods and informed grounded theory (Thornberg, 2012) to analyse the data. The data from the research project encompasses the following: field notes; audio and video recordings of actions and dialogues; observation of the teachers and students in class; questionnaires and semi-structured interviews with the teachers and students. The teachers' new learning designs, ideas and presentations from all the workshops (which are presented on a webpage) are also part of the data. The data was collected from eight development workshops in fall 2013 with one teacher team and manager (n = 5) and six test and development workshops in spring 2015 with another teacher team and manager (n = 6). This article will mainly focus on the six test workshops in spring 2015. Furthermore, more than 200 conversations and interviews have been conducted with the teachers, management and students; questionnaires and other gamified experiments were also utilised with the students and teachers in Global Classroom. This has contributed to a large amount of data, providing a good basis for being able to describe the teachers' experiences when teaching in Global Classroom.

In this next iteration of the DBR, during spring 2015, five new teachers from the Global Classroom learning environment participated in a competence development project. The ITP4T model (Weitze, 2014a) guided the competence development. This framework was co-designed with other Global Classroom teachers in a previous DBR cycle. As part of the current workshops, the teachers were studying literature about pedagogical innovation (Darsø, 2011), reflections on theoretical concepts for the professional teacher (Dale, 1998) and learning designs (Laurillard, 2011). The researcher and author of this paper conducted the first two workshops, introducing the ITP4T and coordinating the goal-setting phase. In the last four workshops, the teachers themselves facilitated the competence-development process. During and after the workshops, the researcher conducted formal and informal interviews with the teachers to be able to identify and investigate the participants' learning trajectories and refine the model further. The researchers' active way of participating in the workshops calls for attention regarding her role, with a danger of biasing the research; at the same time, this approach makes it possible to observe, analyse, learn and bring up relevant theories and share these reflections with the teachers during the different iterations.

4. IT Pedagogical Think Tank for Teacher Teams (ITP4T) – theoretical framework

This article describes the learning and innovation trajectories and knowledge-development processes for the teachers that worked in ITP4T. Therefore, the following presents a short description of work in this *thinking and acting tool* for a continuous competence-development process for teacher teams. Please see Weitze (2014a,b) for an elaborated version of the model and notice that the letters in brackets in the following refers to figure 2. This innovative learning practice consists of a weekly two-hour meeting, with one hour of preparation between these meetings.

To establish the teacher team, the first meeting was used for:

(S) clarifying the problem areas through discussion, brainstorming etc. The teachers wrote up their problem areas individually as well as for the team. The problem areas lead to the goals for their competence-development process. This is illustrated as the coloured lines with the black goal-dots in the bottom of figure 2; as time passed, new goals were set and the level of competence increased.

The teachers also discussed how to evaluate if the problems were solved or the goals were reached. The problem areas, for example, encompassed the following: 1) problematic themes from the Global Classroom learning situation; 2) how to create innovative learning designs in Global Classroom; 3) innovative use of educational IT beyond just videoconferencing and 4) the fact that the teachers were also studying professional theoretical literature, new research, Edu-blogs, videos etc.

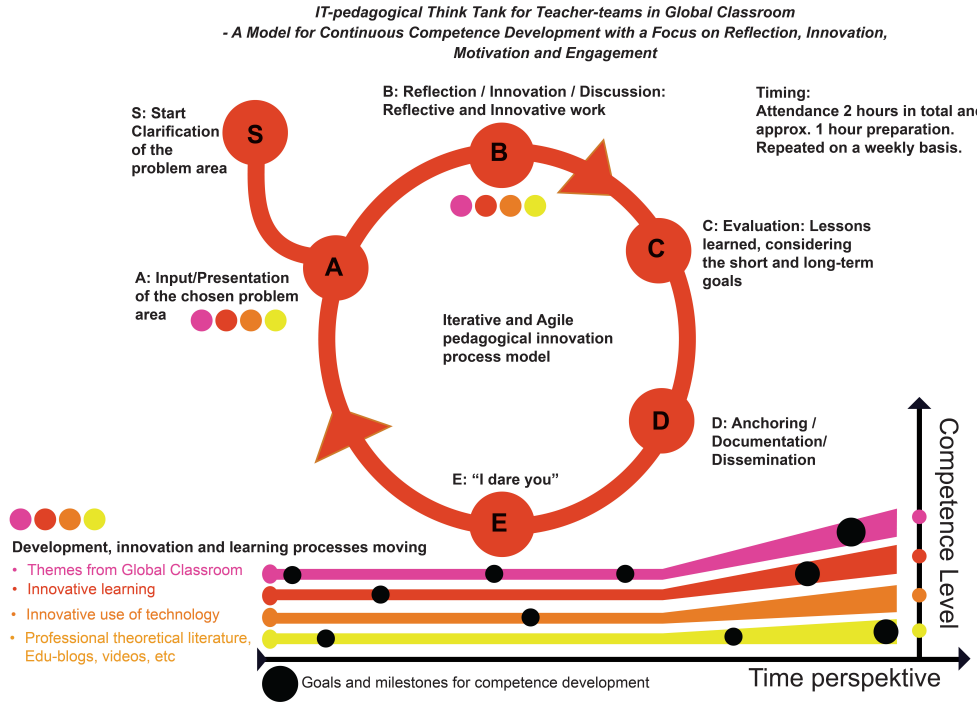

Figure 2: IT Pedagogical Think Tank for Teacher Teams (ITP4T). Please see description below.

At the following weekly meetings, the teacher teams worked through a weekly process consisting of the following:

(A) Input/Presentation of the chosen problem area/theme by the team leader of the day; the team members took turns being the team leader. The presenting teacher's theme was always a *burning problem* or an idea for a solution for this problem (all the teachers prepared an hour for this theme every week).

(B) Reflection/Innovation/Discussion (this was the ideation and development part of the think tank). The teachers were doing reflective and innovative work (Dale, 1998; Darsø, 2011); that is, the teachers intentionally worked at Dales' (1998) third level of teacher competence, putting aside their daily practical and functional practices and instead discussing issues of a comprehensive character and analysing them from a theoretical viewpoint. They were also conscious of dealing with *what they knew* and *what they did not yet know,* and they used structured methods to conceptualise and discuss the problem areas. They also aimed at creating a friendly and open space for this conceptualisation, reflection and innovation.

(C) Evaluation: The team discussed the lessons learned, considering their own short-term and long-term goals as well as new goals. They wrote up these new goals along with the previous goals.

(D) Anchoring/Documentation/Dissemination: For the benefit of memorisation and common explicit conceptualisation of the innovations and solutions, knowledge sharing took place in a structured way on a platform

that was available to all teachers and the organisation. This gave everyone an opportunity to participate in creating and using the new knowledge.

(E) 'I dare you': The team leader of the following week initiated this activity, and together with the team, settled on a task for the following week's meeting, thereby enabling an informed discussion. It was important that some of the tasks consisted of conducting experiments in the class since the main aim for this think tank was to create motivating learning designs for the students. The tasks also consisted of finding and reading new material for a problem area, or finding and experimenting with new educational IT. The teacher team's manager (the head of the department of this school) participated for 10 minutes every week. His interest and support for the team was found to be very important since the aim was to create a new organisational innovative learning design. His participation enabled new forms of knowledge development and knowledge sharing between management and teachers. This innovative and reflective team model is different from traditional teacher teams that often have a more functional and practical focus (Tinglef, 2012).

5. Theoretical and grounded analysis of the empirical data

In the following, the objects of the innovative learning processes are described and analysed, and problems are identified in order to identify the objects and processes in need of pedagogical innovation. This is followed by a theoretical analysis and reflection about how learning and innovative processes are connected in order to develop analytical frameworks and understandings for what is happening and should be supported in a pedagogical innovation and knowledge-development process. Then the article presents examples of what processes, products and new knowledge has come out of the teachers' work in the ITP4T model.

5.1 The objects for the innovative learning processes

In Global Classroom, the teachers aimed at creating motivating learning processes enabling the students to achieve the learning objectives. Therefore, they were concerned with how to create a learning design, and with choosing content and relevant and motivating learning processes that would facilitate this. The teachers would generally begin by taking pedagogical considerations into account when deciding how to enable deep learning processes; furthermore, the use of technology would always be subordinate in the learning design.

However, sometimes the technology comes before the learning design. For example, if the technology's affordance—that is, what it is designed and used for—has inspired the teacher to create a new learning design; or if the technology is a premise in the teaching situation as the videoconference equipment is in Global Classroom. In Global Classroom, the learning activities and processes were mediated through the videoconference equipment for the students who were participating from home. Therefore, the teachers had to re-design their learning designs with this technology and its affordances in mind.

Learning to press the right buttons alone did not teach the teachers how to create deep learning processes in the video conference environment. They had to plan and experience learning situations with the students in order to identify the problematic situations that occurred in this environment (Weitze, 2014a). In addition to the videoconference technology, the teachers also used a learning management system (LMS) that all the students had access to. The LMS was mostly used as a 'virtual desk' where the students and teachers could upload and access relevant literature and assignments. Since the teachers aimed at creating engaging and activating learning processes, they were looking for new teaching strategies and technologies to create learning situations where the students in class and at home could experience equal working conditions and be engaged and activated. The teachers were concerned that the students at home were less active, and generally learned less, and they were therefore searching for ways to improve this experience for the students. One possibility was to be more direct and engage directly with each single student sitting at home; in fact, this was a strategy that many teachers used. However, as most teachers also relied on collaborative and problem-based learning strategies, the learning environment also should be able to facilitate these strategies through combined sociological and technological processes; for example, by using additional educational IT in the video conference setting.

Educational IT is a concept which encompasses a broad range of technologies, including e-books, presentation tools for a range of different and combined multimedia, learning games, virtual shared documents, drawing programs, video conference etc. Some of these technologies are easy to use, but in spite of how well they may have been designed and intended, all technologies possess aspects of affordance, use and implementation that 1) are

unexpected, and 2) are modified according to which setting they are used in. Furthermore, technologies are continuously altered, a frustrating fact for the teacher that has just found his or her favourite tool. In other words, it often becomes complex to find and use relevant educational IT in class. It will always be an explorative process, with the risk of disturbing the intended learning situation, sometimes to a degree that the teaching processes fail in the first experiments, even for the skilled and experienced teacher. Also, small usability issues in the technologies may confuse, delay, disturb or directly hinder the intended learning processes.

In Global Classroom, aspects of class management in teaching may also be affected when using educational IT as teaching processes often encompass social and bodily aspects. In a classroom, for example, we 1) learn collaboratively by sitting together in the physical room; 2) work with learning materials while discussing and negotiating meaning; 3) make spontaneous shifts in learning processes and activities according to what is suddenly needed in the present situation—a rapid change in what we do and in who does what in order to keep the learning situation on track; and 4) when we teach, we work with rhythm and smooth changes in the learning process. Regarding this last point, teachers try to adopt a rhythm that ensures that the students are not kept waiting too long and thus become impatient and lose their concentration. Teachers also employ smooth shifts, which enable the students to focus on what they are working with and learning about, instead of shifting their focus to a mediating technology (Dourish, 2004). To master these aspects of learning situations in Global Classroom requires the teacher to be technologically literate. The teachers had many experiences with how the class management became more difficult and had to be rethought in this new environment.

5.2 Learning and innovative processes

In order to learn how to create innovative learning processes, it is relevant to investigate how the two concepts of innovation and learning relate to each other in knowledge-creation processes. Innovation can be defined as the first introduction of a new product, process, method or system (Quintane et al., 2011). A new invention can be innovative in relation to the individual, a specific culture or the world. In this article, the learning design is considered innovative if 1) the teacher has never tried it before; 2) if he/she is not just imitating what he/she has read or heard from another source, but instead 3) has created this new invention by taking part in a development phase for a new learning design for a learning situation. The following is a description of innovation and knowledge-development processes taking place when creating pedagogical innovative learning designs—a process that the ITP4T model aims to support.

Problems and ideas: In the ITP4T model, the teachers work from a problem-based outset. They work with a burning problem—an issue they have a desire to solve. A problem-based innovation process will start with knowledge, i.e. the teachers' background and experience, as well as non-knowledge, i.e. the solution the teachers are searching for (Darsø, 2011). To move towards a new solution, we need an idea. According to John Dewey, ideas or visions are endpoints we are searching for a way towards. That is, the idea is a tool or the means to provide a solution for our problem. Ideas are therefore also the direction for our investigations (Dewey, 2009/1933). There is not a fixed solution in an innovation process; the problem and the solution will always develop together (Lövgren and Stolterman, 2007). As you get closer to your interpretation and analysis of the problematic situation, the solution will be *your* solution for this interpretation; other teachers can perhaps see other problems and other solutions in the same learning situation. It is not a straightforward process to create a learning design encompassing IT, but rather a process that is experimental and iterative. *Design thinking* is a discipline that aims at innovating by using the designer's sensibility and methods to match people's needs with what is technologically feasible (Brown, 2008: 2; 2009). Although the teachers in Global Classroom are not dealing with the design of software technology from the creator's side (but rather from the user's side), it is worth looking for inspiration for the innovative process from design thinking when designing for the use of technology in educational settings. This will provide concepts that are relevant to discuss and be aware of in processes where you plan how to design for the interaction between humans and artefacts.

Exploration and inspiration: In design thinking, the abovementioned process of defining and exploring your problem area is called *inspiration*. It encompasses the analytic unravelling of the situation as well as gathering new knowledge from research and from observation of and discussions with your users or learners (Brown, 2009).

Ideation and reflection: The next step in the innovation process is called *ideation* and encompasses generating, developing and testing ideas. For this process, the designers use brainstorming tools and sketching and prototyping tools for their concept development (Brown, 2009). Pedagogically innovative learning designers also go through an

ideation phase.When ideating, the idea generation and exploration should be kept in a divergent phase—working with multiple proposed solutions or angles of solutions—before going into a more critical analysis (Lövgren, 2007). This encompasses verbal or physical conceptualisation of the ideas, discussion, elaboration, experimentation and test of the concepts. This will provide space for changes to a traditional approach (Brown, 2009; Lövgren, 2007). Reflection on the previous knowledge from the problem area and the new ideas is also an important part of this process (Dewey, 2009/1933). Teachers need to develop skills to master this ideation phase in order to become professional learning designers using educational IT. Therefore, it is important that both teachers and the organisation develop an understanding of the necessity of allocating resources for this phase.

Test, implementation and anchoring: After ideation, there is a more convergent phase where the teachers will have to choose between their ideas. This may lead to synthesis and perhaps recombination of their solutions. Often the students will have been involved in trying some of the teachers´ designs before reaching a meaningful innovative learning design that will match the students, the learning situation and the learning goals of the curriculum. This is called the 'implementation phase' in design thinking.

New knowledge: When the teachers find a satisfactory solution, i.e. a new innovation, they will later be able to unravel how they arrived there—the learning trajectory to their solution that most likely will make it possible to repeat. By 'thinking backwards' in this way, the innovation turns into knowledge again; that is, we now know how to repeat this new learning design, this new learning process or this new way of sharing knowledge in the organisation. For the innovative learning designer, the learning trajectory of the innovation process or product may thus always be understood afterwards—but seldom before. If the innovation process or product was known before, then it would not have been an invention for the relevant teachers; instead, it would just have been a learning process for a known destination.

5.3 Knowledge creation in the team

The following are examples of what processes, products and new knowledge came out of the teachers' work in the ITP4T model. The letters in the brackets are referring to the points in ITP4T (Figure 2).

(S) Goal setting: Since it was difficult for the teachers to create activating learning processes on equal terms for the students in class and at home, the following question was a complex problem area which was proposed as a burning problem from the start: *How can we create activating learning designs for the students?* Though the teachers were experts in various disciplines, this interdisciplinarity in the team helped them focus on approaches to the problems that all could benefit from. At the same time, each teacher could reflect on the solutions from their individual viewpoint. The teachers used interactive project-management software to write up their individual problem areas as well as the common problem areas for the team. They also wrote hypotheses about how they could evaluate if they had reached their goals, which would later give them a feeling of having developed their competence through their own efforts. To identify the problems, the teachers evaluated their learning situations from Global Classroom and were critical when they decided what needed to be changed and what they needed knowledge about. They considered and discussed what knowledge they already had individually, and how this knowledge could contribute in their common search for new solutions. When sharing their individual problem areas, the rest of the team started contributing both their own practical experiences and new ideas for experimental paths to try out. In this way, the teachers in this initial phase had time for their individual reflections and also benefitted from the collaborative learning possibilities that the team enabled. These combined individual and collaborative learning and ideation phases continued throughout the development in ITP4T.

(A) Input/Presentation: In one workshop the team leader of the day had the ambitious goal of creating a learning design for the students in Global Classroom that encompassed physical movement (she was a social studies teacher). She made a PowerPoint presentation for the team that described the problem, and presented new research on the benefits physical movement could provide in a learning design. The findings were that the teachers switched with ease between being a student with a problem area to being a professional teacher finding and presenting relevant research, educational videos or other new knowledge to inform the debate and the innovative process in the team. According to the teachers, this approach was very motivating and also made an important difference compared to traditional meetings where they solely discussed the difficulties of working in Global Classroom. In other words, their reflections now could take place from an informed position and not only based on their own experiences. Furthermore, the teachers experienced that these inputs gave them much more specific and relevant new knowledge

compared to traditional courses; they also gave them a sense of being able to work very specifically with their problems.

B) Reflection/Innovation/Discussion: In the workshops, the teachers designed small experiments for the other teachers in the team to try out. This was arranged as practical hands-on as well as reflective verbal and written exercises. This sparked many discussions and ideas on how to invent and implement the designs into Global Classroom. All in all, it enabled the teachers to develop innovative knowledge about how to create new processes and products together, thereby allowing conceptual discussions to move alternately between a theoretical, conceptual level and a practical level. In every workshop, the teachers had planned methods and chosen tools for this collaborative ideation and experimentation. In the workshops, one or two of the team members participated by videoconference from home, and many of the used tools and methods were Internet-based. This enabled the teachers to 'take their own medicine' and in a safe place try out the interactive tools that they considered using for the students' learning designs. The teachers thus developed informed ideation processes and experiments, which were facilitated by relevant tools.

In the physical movement workshop (mentioned above), the teachers tried out a learning design encompassing a mobile chat-based walk-and-talk assignment to experiment with the students at home moving and interacting with the students in class in equal conditions. The teachers thus developed prospective knowledge since they aimed at being innovative and planning for the future learning design (Goldkuhl, 2012). They also developed normative knowledge since the goals for their innovative learning designs was to motivate students and create deep learning processes. The teachers were operating in a free and open space, developing skills as innovative learning designers, with methods and tools that enabled them to experiment together with peers in an atmosphere that generated new ideas, informed by new knowledge. Here they had the opportunity to develop competence to experiment on new and unknown ground and seek for information that could inform their individual problem areas. According to the teachers, the shift from being a teacher who was searching for relevant training and competence development to being a teacher that was responsible for her own experiments within a problem area was experienced as a motivating and much more relevant and concrete competence-development process while learning together with and being inspired by peers.

(C) Evaluation: The purpose of the teachers' evaluation was to return to their initial goals, evaluate how far they had come and develop a common language for their pedagogical innovation products and processes. As part of starting to work in this ITP4T, the teachers read literature about learning designs, pedagogical innovation and being a reflective teacher developing theory through research. This gave them a common ground and a theoretical/conceptual pedagogical language. Though they all had read this kind of literature before, the teachers expressed that this was important for the quality of their conversations and new concepts, and thus made it possible to share and develop their (often tacit) knowledge within their teaching domains.

D) Anchoring/Documentation/Dissemination: All of the teachers' presentations, innovative products and new learning designs were presented on a webpage in order for other teachers to benefit from this new knowledge. However, the teachers had many discussions on how and where to disseminate the new knowledge, and agreed that an oral and practical dissemination would have the best effect. Together with the manager, they therefore proposed a new practice at the school where teachers could meet for an hour in the computer room every Friday morning. Here they could educate each other and develop the new knowledge and practices further. This would also overcome the teachers' concern about disturbing their busy colleagues with questions about alternative teaching practices and use of new technology. The manager supported this proposal and discussed how to make it become practically possible together with the teachers. Disseminating the prescriptive knowledge the teachers had developed enabled them to explain what to do in specific learning situations with specific technology in a way that enabled other teachers to learn from them. The new knowledge the teachers disseminated was developed by 'thinking backwards' about how they solved their problematic issues, thereby creating the transformation from innovation to new knowledge.

E) 'I dare you': According to the teachers, one of the most crucial points for the development process was this last assignment in the ITP4T. It made a difference to have this common challenge and to come prepared to the next meeting; for example, when all the participants had used one hour for reflection, looked for new pedagogical-technological solutions, experimented with their students and/or had read and discussed a text in an online debate forum with the team. In this way, they had moved themselves to a new place before the next meeting and had

already moved beyond the practical knowledge from their habitual teaching practice. In these individual 'I dare you' assignments, all the teachers actually moved through an additional round of the points in ITP4T; for example, they identified the problems in the assignment, looked for new research, reflected, experimented and evaluated.

The manager's role: The manager (the head of the department) participated for 10 minutes in every workshop. He expressed that it was valuable for him to get insight into how and what the teachers discussed and innovated on. By participating, the manager was inspired to find new ways to share knowledge in the organisation, and also learned about the teachers' new skills. For the teachers, the manager's participation made them feel that he was interested in their innovative designs, and this was motivating for them. Additionally, it may be easier to implement new ideas if the manager that participates has the power to make decisions about new changes in the organisation. A teacher working in ITP4T observed as follows:

> Pedagogically, it's [ITP4T] very much about how to think new thoughts and how to think outside the box, and this is perhaps what we have come a long way doing. This also means that in the future we will be able to explore different places than we normally would.

The members found that the quite tight structure of the framework worked well as a model and enabled them to develop many new ideas. They all used their new learning designs with the students, and some of the designs were used by several of the teachers. The teachers agreed that it would be a good frequency to go through four or five workshops in ITP4T twice a year, depending on the number of team members. The organisation has decided to educate a member of the pedagogical IT staff to coordinate the initial phases for new ITP4T teams as they learn to work in the model. The ITP4T model was only developed and used by two small groups. To test the positive results, this DBR experiment should be scaled and tried out by new teacher teams.

6. Conclusion – new innovative competences

By working in this model, the teachers developed new competences that they were able to transfer to their teaching practice. They became innovative learning designers developing new knowledge concerning learning designs, new use of technology and new ways of sharing knowledge in their educational institution. The teachers became able to identify and formulate possible problem areas in their educational context, always with the central aim of creating motivating learning designs for the students. They acted as team managers and were able to design and create innovative pedagogical processes with collective reflection, finding and discussing relevant literature in relation to current issues. The teachers invented and carried out development processes leading to individual as well as team-based goals for innovation; they were also able to find and use relevant tools and methods to facilitate the ideation phases for the team. All teachers were innovative in relation to their own teaching, involving pedagogical strategies, new technology and new/innovative learning designs. All teachers contributed to reflections on how to design a strategy and method for knowledge development, knowledge sharing and anchoring in the organisation. The teachers co-designed the development and tested a new innovative organisational learning design, transforming non-knowledge or problems into ideas and pedagogical innovation and then back into new anchored knowledge in the educational organisation. The teachers and manager found it motivating and effective to work in ITP4T; it provided them a new frame and support to be responsible for their own learning processes. Therefore, the teachers and the organisation should develop an understanding of the necessity of allocating resources for ideating and developing new learning designs. It will be interesting to scale this research and try it in other learning contexts.

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